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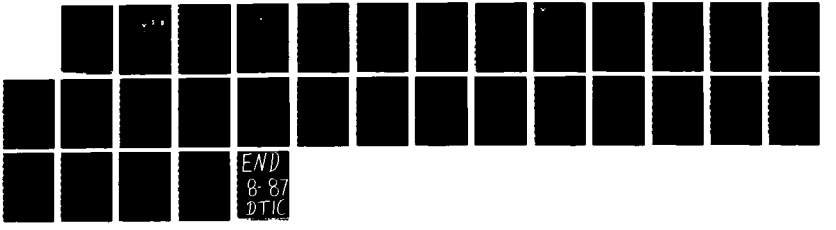

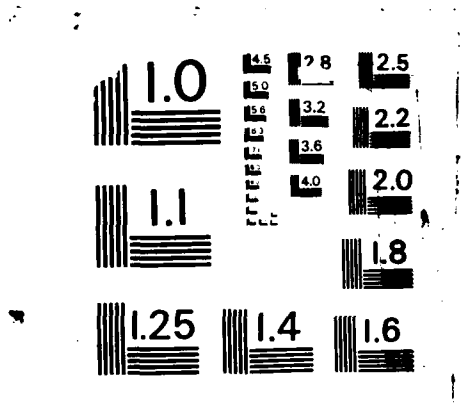

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AIR COMMAND AND STAFF COLLEGE

STUDENT REPORT

COMPUTER-BASED TRAINING SYSTEMS
ORGANIZING TO USE THEM

Major Donald B. MacNiven 87-1615

"insights into tomorrow"

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TITLE COMPUTER-BASED TRAINING SYSTEMS:
ORGANIZING TO USE THEM

AUTHOR(S) MAJOR DONALD B. MACNIVEN, USAF

FACULTY ADVISOR MAJOR MICHAEL L. MCKIM, USAFR

SPONSOR COL J.P. FLANNERY, HQ AFSPACECOM/DOT

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The Air Force does not currently have adequate organization and control of computer-based training (CBT) efforts at the small unit level. The use of CBT has the potential for improved training at lower cost, but that potential is often not realized. Advances in computer technology have made CBT systems more readily available, and their use is spreading rapidly. A lack of organization causes duplication of effort, a failure to share resources, and poor training for CBT developers. This paper traces the development of CBT systems in the Air Force, looks at present systems, reviews recent DoD organization initiatives, and discusses areas for improved use of CBT within the Air Force. Keywords: Computer-aided instruction, computer programs

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PREFACE

I am not a computer expert, but I can see the kind of impact computers have on our daily lives. The fact that I wrote this report using a personal computer certainly had an impact on me. It made it much more enjoyable.

I am not interested in computer-based training from a technical point of view, but rather from the standpoint of an instructor. If a computer can help me teach better and at the same time help a student learn faster, then it would seem to be a tool worth using.

What this report hopes to do is to improve the way we work with computer-based training systems from an organizational point of view. The computer experts have designed systems that can help us teach, and now it is up to us to look for ways to use the systems effectively.

ABOUT THE AUTHOR

Major MacNiven received a Bachelor of Science Degree in Engineering Management from the United States Air Force Academy in 1972. In January 1973, he was an Honor Graduate of the Aircraft Maintenance Officer Course at Chanute AFB, Illinois. His initial assignment was with the 11th Air Refueling Squadron at Altus AFB, Oklahoma. While At Altus from February 1973 until April 1974, he served in a variety of aircraft maintenance officer positions working with KC-135s. In May 1976, Major MacNiven was transferred to Andersen AFB, Guam. He served in Job Control and as the Maintenance Supervisor of the 43d Field Maintenance Squadron supporting B-52Ds. He attended Squadron Officer School in March 1977 and was selected as a Distinguished Graduate. Upon his return from Guam in April 1978, Major MacNiven received an assignment to the faculty of the Squadron Officer School at Maxwell AFB, Alabama. While at SOS, he served as a section commander, a curriculum developer, and a lecturer. Major MacNiven went on to serve as the Chief of the Maintenance Management Division with Detachment 192 in Incirlik AB, Turkey from June 1981 through June 1982. He returned to an assignment at the United States Air Force Academy and worked with the Professional Military Training program. In June 1984, Major MacNiven became the Air Officer Commanding of the Academy's 22nd Cadet Squadron and served in that position until July 1986. Major MacNiven holds a masters degree in management and is currently attending the Air Command and Staff College at Maxwell AFB, Alabama.

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EXECUTIVE SUMMARY

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"insights into tomorrow"

REPORT NUMBER 87-1615

AUTHOR(S) MAJOR DONALD B. MACNIVEN, USAF

TITLE COMPUTER-BASED TRAINING SYSTEMS--ORGANIZING TO USE THEM

I. Purpose: To suggest ways the Air Force might organize to more effectively use computer-based training systems.

II. Problem: Although computer-based training (CBT) systems have been shown to be effective teaching tools, organizational problems exist in applying them widely within the Air Force. As CBT systems have become more available and affordable, the number of applications in the Air Force have expanded. Today all MAJCOMS are involved with CBT to some extent. Organizational shortfalls within the Air Force have resulted in lack of standardization of both hardware and software, duplication of CBT development efforts, and a lack of support and training for CBT developers. This prevents the effective use of CBT.

III. Data: Extensive developmental programs involving CBT within the Air Training Command over many years proved CBT worked. A wide variety of CBT systems is now available and trainers at the small unit level are developing many more applications. These individuals cite problems of lack of standardization, guidance, and training.

CONTINUED

IV. Conclusion: CBT can be effective if developed and applied properly. The Air Force needs to organize itself to make better use of the technology on a wide-scale basis. Not all MAJCOMs have not established effective single-points of contact for CBT matters. Additionally, personnel involved with developing CBT are not well supported or trained.

V. Recommendations: The MAJCOMs must take a more active role in monitoring CBT applications. The Air Force should establish an agency within the Air Training Command with the expertise and equipment to help current and future CBT users evaluate and develop effective programs. The Air Force should develop a training program for personnel involved in CBT and track this expertise with a special experience identifier.

Chapter One

INTRODUCTION

Computers have become and will continue to be an integral part of Air Force training programs. Along with the other services in the Department of Defense, the Air Force has helped develop computer-based training (CBT) systems (8:3) and has shown them to be effective in reducing overall training costs. These systems use the communication and storage capabilities of a computer to provide direct presentation of instructional materials, allow for practice by the learner (8:9), and also handle a myriad of administrative tasks for the instructor.

The potential for CBT systems is vast, and every major command in the Air Force is now using the technology (14:--). New advances in computer hardware and software will, in the near future, enable the systems to run on desktop computers and be coupled with videodisc players, making CBT even more available at the local level. The attractiveness of the technology does not however, lie with its "bells and whistles" approach but with its effectiveness as a teaching tool and the cost benefits it can provide. While CBT systems can produce powerful instructional tools, the flurry of development activity by government agencies and private industry alike has not been without its problems.

STATEMENT OF THE PROBLEM

Currently, the Air Force is not well organized to handle CBT development and realize all of the training benefits it has to offer. Studies of CBT systems have shown that computers can increase training effectiveness, reduce total training time, and lighten administrative workloads (9:3-6). As a result of these potential savings, the Air Force made a commitment to use computers in training and now has a vast array of systems in use. This commitment to the technology however, has not been followed by the necessary organizational changes needed to manage CBT effectively. Today, both present and potential users of CBT are faced with a lack of standardization in equipment and computer

languages, little or no training for themselves, and no place to go for help. This has resulted in unnecessary duplication of program development efforts, a lack of coordination and communication among CBT users, and an overall patchwork approach to the application of CBT systems. This is not an effective use of valuable training dollars. Training costs have always consumed a huge part of the Air Force budget in terms of manpower, money, and equipment; and at a time when sharp budget cuts are eminent, the Air Force must make the most out of every training dollar it spends. Accordingly, the Air Force needs to make organizational changes in order to use CBT to its full advantage.

ASSUMPTIONS

Computer-assisted instruction (CAI) is defined as the use of the communication and storage capabilities of a computer to manage the direct presentation of instructional materials and/or provision of practice to the learner (8:9).

Computer-managed instruction (CMI) is the use of a computer for testing, scheduling, allocating resources, collecting student data, and providing status reports (8:13).

Computer-based training (CBT) systems use a combination of both CAI and CMI.

Computer based-training systems (CBTS) are not applicable to every training situation. As an example, they would not be cost effective if used with a very small student population or for one-time training requirements that could be presented by lecture or in print. CBT systems should be integrated where needed as part of an overall systems approach to training requirements.

When properly designed and used, CBTS can produce quality, cost effective training.

LIMITATIONS

The use of simulators and computerized gaming is not within the scope of the study.

Chapter Two

HISTORY OF COMPUTER-BASED TRAINING SYSTEMS IN THE AIR FORCE

Educators have been interested in computers as instructional tools for decades (3:7). They saw programmed texts, developed in the late 1950s and early 1960s, as ideal candidates to convert to computer instruction. Eventually, educators, trainers, and behavioral scientists adapted the programmed texts for computer presentation as computers became more readily available. The instruction took the form of a traditional text broken down into 'frames'. Basically, the computer presented the 'frames', asked questions, and responded to multiple choice answers from the student. If the student's response was correct, the computer displayed the next 'frame'. If the student answered incorrectly, the computer presented the material again. During these first attempts at computer-aided instruction (CAI), the early computers were expensive to buy, maintain, and program. As a result, program developers saw CAI's future to be with large-scale systems "using many students to amortize the costs" (3:7). Since the military had an ongoing need for training large numbers of students, the services were an ideal testing ground for CAI.

The Air Force helped pioneer the development of CAI with projects occurring at Chanute, Sheppard, and Lowry Technical Training Centers (8:3). The PLATO (Programmed Logic for Automated Teaching Operations) computer-based instruction system was used extensively at Chanute and Sheppard Technical Training Centers while the Advanced Instructional System (AIS) was tested at Lowry AFB.

PLATO

PLATO started as a research project at the University of Illinois in 1959 (2:33) and is now the oldest and largest computer-based instruction system available (8:3). In 1972, the Air Force began a tri-service evaluation of PLATO after receiving funding from the Defense Advanced Research Projects Agency. The Technical Training Center at Chanute AFB, Illinois was chosen to perform the evaluation with the

first phase beginning in July 1972. This phase continued until June 1974 and included the operations planning and acquisition of equipment. During the second phase (June 1974 until January 1976) Air Force members working closely with civilian contractors developed CAI to be part of the Special Purpose Vehicle Repairman courses at Chanute. The third phase began in October 1975 and ran until September 1976 and consisted of a series of seven experimental lessons (8:3). While not without its problems, the entire program produced dramatic results and was an overwhelming success.

In the area of instructional effectiveness, student test scores showed the PLATO program was as effective as the regular course with a 28% savings in time. Instructor evaluations noted students using PLATO were more attentive when compared to those using programmed texts and workbooks (8:4).

With the computer technology of the mid 1970s, the PLATO program was more costly than the conventional course by $87,500. "However, cost-avoidance savings due to the total combination of instructional system development procedures, PLATO, and instructional material design was determined to be $180,000 a year" (8:4).

Also of concern to evaluators of the project was the impact PLATO had on students' and instructors' attitudes. Course critiques from students using PLATO showed they had a more positive attitude toward the course than other students not using the PLATO instruction. Instructors attitudes were initially positive, but declined as they became dissatisfied with their less direct role in the instruction process. It became clear that the changing role of the instructor should be a concern for future CBT systems (8:4).

Throughout the project it became apparent that course instructors by themselves could not develop large-scale CAI. Evaluators felt a team approach drawing on the expertise of computer programmers, systems designers, and subject-matter experts was needed to produce the best computer-aided instruction (8:4).

Overall positive results achieved at Chanute were also seen in tests of PLATO at the Air Force's School of Health Care Sciences. The school, located at Sheppard AFB, Texas, ran an evaluation of PLATO between 1975 and 1977 (5:9). Applied to the Physicians Assistant course, CAI showed encouraging results in both student performance and reduced training time.

With CAI, student performance increased by 18% over traditional lecture based instruction. For low aptitude students, it proved to be 17% more efficient than programmed texts. Additionally, high aptitude students showed a time savings of from 29-32% (8:5). In student course critiques, "favorable comments toward CAI were primarily related to the ability to progress through the course on a self-paced basis" (5:20).

In the area of management however, "the results of the PLATO evaluation at Sheppard AFB pointed out the need for extensive preplanning activities to ensure that appropriate staff personnel are in place and that course instructional staff are trained prior to the implementation of CAI" (8:5).

AIS

The Advanced Instructional System (AIS) "was developed to demonstrate the feasibility of managing and administering individualized instruction for up to 2,000 students daily in four Air Force technical training courses" (9:i.) This computer-aided instruction system "was to be the first large scale integration of technology to produce cost-effective individualized instruction" (7:3). It was designed to provide a "full range of Computer-based Instruction (CBI) functions, *including course development and presentation*, resource allocation and scheduling, and individual student management (9:i). Presently, AIS is being used in a variety of programs within the Air Force Systems Command, the Strategic Air Command, and the Tactical Air Command (8:5).

An important part of the AIS program was its use of an authoring system designed to make it easier for instructors to write CAI without extensive training in computer programming. Based on experience with the PLATO system, recommendations for future computer-aided instruction programs called for the use of "a development team consisting of both instructors and CAI authors" (8:6). AIS simplified the authoring system so the subject matter experts (instructors) could also produce the CAI material without being experienced computer programmers. The results from AIS showed that instructors could develop effective CAI materials when using the authoring system and that the availability of a simplified authoring system had a great deal of impact on the organizational acceptance of computer-aided instruction (8:6).

AIS produced very positive results from the beginning of its operation in 1975 through the end of the evaluation in 1979. First, the system averaged 11.2% less

administrative time. Also AIS lessons had only a 6% failure rate compared to an average 23% failure rate with programmed texts (8:2). And 20,000 students graduated from AIS courses with demonstrated training time reductions of 15-50%. Their overall attitudes were positive with 80-90% reacting favorably to the instruction. Test achievement among the students was comparable to conventional instruction. Six months after the students completed training, follow-up questionnaires sent to their supervisors rated 95% of the students as satisfactory or better. The majority of the students (68%) were rated in the two highest categories, either 'very satisfactory' or 'excellent' (9:5). Clearly the AIS evaluation demonstrated the capability of CBI to produce large numbers of highly qualified students while doing it in less time than conventional methods.

Both the PLATO and the AIS systems required large mainframe computers and an extensive support team to develop, program, and administer CAI and CMI; but they proved the computer to be an effective teaching tool. They helped pave the way for future refinements in computer-based training systems and helped spark the imagination of trainers concerning new applications of this technology. As a result of its experience with these two systems, the Air Force decided to use CBT more extensively.

Chapter Three

PRESENT CBTS ACTIVITIES

The Air Force and the Department of Defense have made a large-scale commitment to computer-based training. It is easy to understand why when one views the magnitude of training requirements. The Air Training Command alone annually "trains 344,000 people in more than 4,300 courses covering some 300 specialties" (1:66). Since CBT can produce results equal to or better than conventional methods and significantly reduce the training time required, there is little wonder why CBT systems are so appealing.

Some of the current Air Force computer based training systems efforts are listed below:

--ATS. The Advanced Training System is designed to provide the Air Training Command a computer-based training system with a wide range of capabilities. The system accomplishes "six training delivery tasks: information presentation, demonstration, drill and practice, evaluation, feedback, and remediation" (8:6). The management function schedules the students, instructors, and equipment. It also follows each student's progress and evaluates the instructional process.

--BLTMS. The Base Level Training Management System is an in-house effort of the Air Training Command. The system provides "a computer-based data collection and management capability that provides an interface between ATC technical courses and the Advanced Personnel Data System" (8:6). Additionally, it provides course management and course documentation.

--TRIM. The Time Related Instructional Management system provides CAI for Undergraduate Pilot Training, plus flight training management and scheduling support (8:6).

--PLATO. CAI continues to be provided by the PLATO system at Sheppard and Chanute Technical Training Centers (8:7). Contract instruction using the PLATO system is also used in programs such as KC 10 aircrew training (2:36).

--CDTS. The Computer Directed Training System originated at Keesler AFB, Mississippi in 1968 as a way of using a computer to teach people how to use a computer. It provides on-the-job training for the Base Level Military Personnel System and the World Wide Military Command and Control System (8:7).

--ISS. The Instructional Support System provides software for supporting computer-aided instruction and computer-managed instruction and is available for DoD use. The software is designed to operate on a variety of computer systems and was developed from the AIS. It uses Ada, a computer language designed to be compatible throughout the DoD (8:7).

--AOTS. The Advanced On-the-Job Training System is under development at Bergstrom AFB, Texas. It is designed to make base level OJT more effective by giving supervisors a training plan individually tailored to each worker. It compares job requirements with the worker's qualifications and produces a prioritized OJT schedule. "AOTS may identify and schedule by task, qualified and available trainers, technical references study guides, supplies, equipment, weapons systems, and facilities necessary to support training" (1:58).

- TRIADS. This is a Department of Defense joint service effort that involves developing a library of programs that relate to computer based instruction. The purpose is to "develop software quality standards and instructional quality standards for programs to be included in the system library, demonstrate the programs and develop user training" (3:16). "The hardware for TRIADS is to feature modularity and interdevice compatibility" and the software is to be based on Ada, the new DoD language (8:8).

- TPSS. The Training and Performance Support System is a computer based system developed for the Air Force Systems Command. "The system was designed for novice and less experienced acquisition managers and provides...individually tailored curriculum...'as required'. Each lesson topic...provides job performance aids in the form of policy, lessons learned, procedures, and technical background information" (8:8)

As you can see, a wide variety of programs are underway, but they are not without significant problems. Most of the systems rely on different computers with different software. The DoD has recognized the problem of lack of standardization in software and has developed Ada, designed to be a standard language, but it will be many

years before all existing programs are converted, if at all. A standard for computers has yet to be established. The computer industry is developing so rapidly that systems become outdated quickly. Recent advances in commercially developed CBT software has made courseware preparation easier and reduced the number of manhours needed to produce each hour of computer instruction. This is both good and bad. It makes CBT more available on a smaller scale, but at the same time it makes standardization that much harder. Along with the problem of standardization is one of training. The early tests involving PLATO and AIS pointed out the need for instructors trained in the use of CBT and a team approach to course development. New systems boast of easy to prepare CBT but experience is proving that new course developers need good training to produce quality materials.

Changes are coming in how the DoD is organizing to make better use of CBT and are covered in the next chapter.

Chapter Four

ORGANIZATIONAL CHANGES WITHIN THE DoD

After years of study and analysis, many of the technical problems initially encountered with computer based training systems have been solved. The question today is not "Should we use computers?", but "How can we best use computers?" The systems have proven useful, and the commercial marketplace now has a myriad of computers and programs to produce computer based training. The Department of Defense helped pioneer this effort with programs in each of the services. To reduce duplication of effort and to standardize some of the equipment and software used in the DoD, several key organizational and management changes have taken place in recent years. In 1982, the Report of the Defense Science Board on Training and Training Technology concluded that "major improvements in training are necessary and that technology will contribute significantly toward effecting these improvements" (10:iii) Among the primary conclusions of the study was one which stated "Much improvement in readiness is available through improved training. High technology can help. Rapid progress is possible with promise of high payoff by funding known successful applications such as computer aided instruction" (10:v) But it also went on to say, "Easily identifiable proponency is missing in OSD and the Military Departments to direct R&D relating to training, to review technology for training applications and to influence training initiatives" (10:v). In other words, there is a lack of central focus and control.

The Defense Science Board panel made some key recommendations in its November 1982 report The Secretary of Defense reviewed their findings and approved them in February 1983. The first recommendation under organization and management (one of three areas addressed) was to establish a steering committee focusing on training and training technology. The Chairman of the Joint Chiefs of Staff has initiated this action to get "a high level perspective and proponency" on the overall training system. There was a need to "strengthen the position of training at the budget table, and help to prevent administrative and technical duplication of effort" (10:6).

The next recommendation was to establish a "Defense Training Data Center for all training-related data" (10:6). The Defense Training Data and Analysis Center (TDAC) was established in Orlando, Florida (the name has since been changed to the Training Performance and Data Analysis Collection, (16:--)) and is collocated with the Naval Training Equipment Center and the U.S. Army Program Manager, Training Devices (4:47). The center is the focal point within the Office of the Secretary of Defense for defense training-related data such as training loads, flow rates and training support. Their chief "product is information needed for decision-making." (4:47)

The third recommendation was to "revise the acquisition process to (a) ease procurement specifications and standards, commensurate with training/device use; (b) acquire training requirements data earlier in the weapon system development cycle" (10:8). Many training devices were being needlessly "over engineered" when they were designed to meet standards for equipment intended for field and combat conditions. There was also a frequent compiaint that training devices arrived too long after the weapons systems were fielded (10:8). The recommendation was made to save time and money by "eliminating excessive design/manufacturing requirements" and "to have the training devices in place by the time they are needed" (10:8).

Another recommendation was to have the "service laboratories increase funding and management emphasis on training technology" (10:9). The Board felt that "with few notable exceptions, the laboratories' R&D priorities are not driven by operational requirements or problems. Moreover, operational people, when faced with immediate applied questions, rarely look to the laboratories for answers" (10:9).

The final recommendation in organization and management was to "provide a single point of contact for proponency and coordination of training and training technology" within each service (10:9). This was to help communication and make the best use of limited resources. The Air Force now has an office which serves as its single point of contact and it is HQ USAF/XOOTW (14:--).

The process of integrating computer based training systems has in the author's opinion taken two giant steps with a third yet to be completed. Step one was the design, development and testing of the technology. Step two was the recognition and action at the DoD level to organize the defense training community to establish single points of contact within each service for training technology needs.

to standardize systems, and to provide for information sharing. All these efforts help make the training community better able to state its case, operate more efficiently and ultimately provide better and cheaper training. The initiatives have yet to stand the test of time, but they represent a good start. The third step is for the Air Force to organize itself to use CBT better.

Chapter Five

CBT ORGANIZATIONAL PROBLEMS IN THE AIR FORCE

The Air Force is not well organized to support CBT within small organizations. The Air Training Command has a great deal of experience working with CBT on a large-scale, but experience is lacking within many smaller organizations. Much of the present CBT development is occurring in small units such as combat crew training squadrons, the Air Command and Staff College, and individual departments within the faculty of the Air Force Academy. To assist CBT in the areas it is growing the fastest, the smaller units, the Air Force must do several things.

First, the Air Force needs single points of contact for CBT matters at each of the MAJCOMs. At present, not all MAJCOMS have established an office of primary responsibility (OPR) and this is causing confusion and wasted effort at many levels. HQ USAF/XOOTW (the Air Force's CBT OPR) held a conference in December 1986 and discussed computer-based training systems. While each of the MAJCOMs was represented, the feeling was the Air Force as a whole was "not very well organized" (14:--) to use the systems to their greatest advantage. In one command, the DO, LG, and IN communities were all developing and using CBTS without knowledge of what the others were doing. When problems of lack of coordination were discovered in another command's aircrew training community, the policy of MAJCOM/DO checkoff was established to force coordination at least to that level (14:--).

The situation is particularly frustrating for those units that can see benefits from CBT and want to use the available technology. A great deal of time is spent just getting started. With no central point of contact, the potential user is forced to develop his own sources of information on systems capabilities, availability, development, and application. The 4235th Strategic Training Squadron has become the advocate of computer based training for the operations field within the Strategic Air Command. They found "one shortcoming appeared and reappeared again and again: Organization. There weren't any recognizable CBT advocates around... there were CBT supporters but they

weren't out there, day in and day out, advocating CBT applications." They took their concerns to SAC headquarters and within three months were appointed the CBT OPR for SAC Operations (12:I-4).

It is easy to imagine how potential CBT users could end up duplicating the mistakes of others. Dr. Jerry Boling of the International Officer School at Maxwell AFB, Alabama, stated there is a need for information crossflow. There is a need to know what systems are available, who is doing what, and what are the ingredients for a successful program (15:--). An effort is currently underway by Major Mike McKim (a Reservist assigned to Air University) to produce a newsletter to aid communication in what has become a word of mouth community. He has undertaken this effort on his own including personally shouldering all printing costs (17:--). A command single-point of contact could go a long way to meet the information crossflow needs involving CBT and make individual efforts unnecessary.

Air University has taken the first step to providing that contact within its command. AU/XPZ is responsible for training technology, and they have established the Air University Technology Applications Committee to increase the sharing of ideas and resources between the component schools of the Command (6:vii). This structure is not without its problems, but it is responding to recognized needs.

In addition to MAJCOM single-points of contact, the Air Force should establish an organization with the ability to help users develop effective computer-based training systems quickly and easily. Currently, many of the user developed training programs are produced through trial and error. Individuals have had to train themselves on the use of the computer systems, a task that has not proved easy. The Air Command and Staff College Directorate of Associate Programs had problems using an authoring system when producing their own computer-based instruction. They found the curriculm writers, who were subject-matter experts not computer programmers, could not immediately use the system. The designers of the system assumed that all of the educational questions had been answered and the lesson logic had been developed, and all of the Instructional Systems Development concerns had been taken into account. Thus, ACSC found the authoring system reduced the need for a computer programer, but a systems designer was still needed to work closely with the subject-matter experts (11:I-20).

The Air Force Academy has developed a Computer Learning Laboratory (CLL) to solve problems at the Academy that are similar to those encountered by ACSC. The Academy describes

the CLL as "an emerging concept of service to the faculty and students." Its purpose is "to enhance undergraduate education through the use of computer-based tools" (13:I-86). The CLL helps the various faculty departments prepare computer-based instruction by providing the computer expertise with courseware development. The various departments supply subject-matter experts, and the CLL advises on the appropriateness of computer-based tools, offers the programming expertise, provides computers, and helps develop the best product for the need. The CLL also experiments with new technology products looking for ways to apply them to education.

An Air Force-wide resource such as the Academy's CLL could help immeasurably in developing computer-based training. The 4235th Strategic Training Squadron's Technical Applications Branch at Carswell AFB, Texas, is one unit that has been forced to get much of its computer-based training experience the hard way. They had an opportunity to develop a CBT system for the FB-111 Avionics Modernization Program when they were tasked to produce flight crew training devices to teach the avionics updates. They realized "that there were no existing guidelines for systematically designing, selecting, and implementing a fully operational CBT system for military applications." They used a team approach and developed a checklist which enabled them to accomplish their task. They offer these words of caution to others: "CBT is one medium of instruction and should be chosen as carefully as another medium in accordance with the ISD model. It can be a superior method of instruction if used properly, but used improperly, it can be more like an albatross" (12:I-2). If an agency like the Academy's CLL had been available to assist in CBT development, the task would have been much easier for the 4235th STS. Many others could avoid a potential "albatross" as well.

The Air Force also needs to develop a training program for those involved with computer-based training. It seems obvious that people developing computer-based training for others need to know what they are doing, but to date much of that experience has been gained through trial and error. Members of the 4235th STS have been directly involved with CBT development for over four years but readily admit that the experience was gained through, "years of trial and error, learning to ask the correct questions and of developing successful solutions to the various training tasks we were tasked to support" (12:I-2). Others illustrate this situation when they tell of a lack of expertise with CBT throughout the Air Force. In one instance, a complete interactive videodisc system was found

in a hospital storage room. The system had been procured through the efforts of a CBT advocate on the hospital training staff, but after that individual was transferred, no one else knew how to use it (15:--).

Some might argue that the Air Force should get out of the computer-based training business and that contract support is the way to go but there will always be a need for subject-matter experts to assist in program development. From the first Air Force experience with PLATO, program evaluators recommended the need for a team approach to CBT development. It makes good sense to train Air Force members responsible for producing quality CBT products. Once trained, members could receive a special experience identifier (SEI) that would be used to track them in the personnel management system. No longer would that valuable experience be "lost" and not able to be drawn upon at a later date if need be.

The Air Force could improve the way it is organized to handle CBT by acting on the recommendations in the next chapter.

Chapter Six

RECOMMENDATIONS

1. The Air Force should establish single-points of contact for computer-based training within each of the MAJCOMs. These single-points of contact should monitor and assist computer-based training efforts within their command and maintain close liaison with the Air Force OPR.

2. The Air Force should establish an agency within the Air Training Command with the expertise and equipment to aid current and future computer-based training users develop effective programs. The agency should be prepared to provide computer expertise and work in concert with subject-matter experts to prepare computer-based instruction appropriate for the need. The Air Force Academy's Computer Learning Laboratory could serve a model for this new organization.

3. The Air Force should develop a training program within the Air Training Command for personnel involved in developing computer-based training programs. A special experience identifier (SEI) should be used to track personnel trained and experienced with computer-based training systems.

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